7C, which correspond to the ones shown in **FIGS. 3D** to **3F**, are treated. In **FIGS. 7A** to **7C**, the central area of a substrate **32** is omitted to illustrate the outermost ends of the substrate **32**, where the ends of a device are formed. At the steps shown in **FIG. 7A**, the substrate **32** is heated in a non-oxidizing and non-nitridizing atmosphere with a pressure of 1 to 600 Torr containing an n-type dopant gas.

[**0081**] In this embodiment, the dopant contained in the heating treatment atmosphere is diffused into the n-type drift layer **2**, in which epitaxial trenches **10** have been formed. At that time, the dopant concentration in the heating treatment atmosphere is set such that the dopant concentration in the diffused region of the n-type drift layer **2** becomes, for example, 1×10^{16} to 1×10^{17} cm^{-3}. Other conditions that do not affect the dopant concentration in the diffused region are set to be the same as in the first embodiment.

[**0082**] With the above steps, it is possible to set the dopant concentration in the diffused region to be the predetermined one. In the area where a device is formed, the dopant contained in the heating treatment atmosphere is diffused into the n-type drift layer **2** from its upper surface and the sidewall surfaces **10***a* of the epitaxial trenches **10** such that the entire n-type drift layer **2** has a homogeneous dopant concentration.

[**0083**] In contrast, no trenches **10** are formed in the n-type drift layer **2** at the areas where the ends of a device are formed because no p-type silicon regions **3** are formed at the outermost ends of the device. Therefore, the undiffused portions of the n-type drift layer **2** at the outermost ends of the n-type drift layer **2** remains having the same dopant concentration as that before the heating treatment is treated. Here, the undiffused portions are ones that are distant-from the upper surface of the n-type drift layer **2** and the trenches **10**. In other words, the undiffused portions are ones that are distant from the surfaces exposed by the heating treatment atmosphere.

[**0084**] In this way, a low dopant concentration region **41** is left at the outermost ends of the n-type drift layer **2**, the dopant concentration of which is set to be lower than the predetermined dopant concentration, and a doped n-type drift layer **2**, which has the predetermined dopant concentration, is formed at the area except for the outermost ends. In that manner, a low dopant concentration region **41** is formed outside the super, junction **11**.

[**0085**] Then, p-type layer **33** is formed at the steps shown in **FIG. 7B**. Subsequently, the p-type layer **33** is planarized by CMP to the height of the top surface of the n-type drift layer **2** to form an alternate arrangement of n-type drift regions **2** and p-type silicon regions **3**. Then, the steps shown in **FIGS. 3G** to **3J** are sequentially, carried out in the same manner as the first embodiment to complete the power MOSFET shown in **FIGS. 5 and 6**.

[**0086**] As described above, in this embodiment, the dopant concentration of the n-type drift layer **2** is set to be lower than the predetermined dopant concentration when the n-type drift layer **2** is formed on the n^+-type substrate **1**. Then, the substrate **32** is heated in a non-oxidizing and non-nitridizing atmosphere with a pressure of 1 to 600 Torr containing an n-type dopant gas. At that time, the dopant contained in the heating treatment atmosphere is diffused into the n-type drift layer **2** to supply the dopant to the n-type drift layer **2**.

[**0087**] With this method as well, it is possible to set the dopant concentration in n-type drift regions **2** to be the predetermined one. That is, it is possible to precisely control the dopant concentration of the n-type drift regions **2** even if the heating treatment is treated in a non-oxidizing and non-nitridizing atmosphere.

[**0088**] If the super junction **11** was extended to the outermost ends of the device to improve the breakdown voltage at the outermost ends, the dimensions of the super junction **11** would undesirably increase. In contrast, in this embodiment, the low dopant concentration region **41** is adjacently located outside the super junction **11** at the outermost ends of the device. The low dopant concentration region **41** can be set to be shorter than the depth of the n-type drift regions **2** and the p-type silicon regions **3**. Therefore, it is possible to reduce the dimensions of the device in comparison with the method in which the super junction **11** is extended to the outermost ends of the device.

[**0089**] The low dopant concentration region **41** could be formed at the outermost ends of the device separately from the steps of forming the super junction **11**. However, in this embodiment, the low dopant concentration region **41** is simultaneously formed at the outermost ends of the device at the steps of forming the super junction **11**. Therefore, it is possible to reduce the production steps in comparison with the case that low dopant concentration region **41** is separately formed.

[**0090**] In this embodiment, the n-type drift layer **2**, which has the same conductivity type as the n-type drift regions **2** and has a dopant concentration lower than that of the n-type drift regions **2**, is formed on the n^+-type substrate **1** at the steps shown in **FIG. 3A**. However, the n-type drift layer **2** can be substituted by a p-type layer, which is different in conductivity type from the n-type drift layer **2**. In that case as well, the dopant concentration of the p-type layer is set to be lower than the dopant concentration of the p-type silicon regions **3** that will be included in a completed semiconductor device. The substrate **32** is heated in a non-oxidizing and non-nitridizing atmosphere with a pressure of 1 to 600 Torr containing a gas that includes an n-type dopant, the conductivity type of which is different from that of the dopant contained in the p-type layer. The n-type drift layer **2** is formed on the n^+-type substrate **1** by diffusing the n-type dopant into the p-type layer.

[**0091**] At that time, the diffusion is controlled such that undiffused portions of the p-type layer, which have the same dopant concentration as that before the diffusion is carried out, are left at the outermost ends of the p-type layer. In this way, a low dopant concentration p-type region, which is also called a predetermined layer or a semiconductor layer, is left at the outermost ends, and the n-type drift layer **2** is formed at the area except for the outermost ends. Therefore, it is possible to form the p-type region, which has a dopant concentration lower than the p-type silicon regions **3** and is adjacently located outside the n-type drift layer **2**.

[**0092**] In this instance as well, the low dopant concentration p-type region is formed at the outermost ends of the super junction **11**, so it is possible to increase the breakdown voltage. In the same manner as in the first embodiment, a p-type silicon layer **3** may be formed first, and then the trenches formed in the p-type silicon layer **3** may be filled